

THYSANOPTERA FROM LORD HOWE ISLAND

Laurence A. Mound

CSIRO Entomology, GPO Box 1700, Canberra, ACT 2601

Abstract

Only one species of thrips was previously recorded from Lord Howe Island, but notes on a further 33 species in 26 genera are given here. Most are introduced, either tropical tramps or from mainland Australia, but a few are endemics with some indication of faunal relationships with New Zealand and New Caledonia.

Introduction

Lord Howe Island (LHI) lies off the Pacific coast of Australia, about 700 km north-east of Sydney. Shaped like an irregular crescent, it is scarcely 11 km long with a maximum width of 2.8 km. Despite its small size, it is topographically diverse with two large mountains at one end, Mt Lidgbird (770 m) and Mt Gower (880 m), and a series of lower hills at the other (Hutton 1986). Although it lies well outside the tropics, it supports the southernmost coral reef in the world and a diverse terrestrial flora of more than 450 vascular plant species. Of these plants, at least 250 are recently introduced and a little over 100 are endemics (Green 1994). There is no evidence of human occupation before the visit in 1788 of HMS *Supply* from the First Fleet, on its way from Sydney to Norfolk Island, but the island now supports a population of about 300 people together with a similar number of tourist visitors. Politically it is part of New South Wales, although it is protected as a World Heritage area and much of the land surface remains covered by natural forest.

The flora and vertebrate fauna of LHI are both well documented, but the invertebrate fauna remains poorly studied. A few insect species are evidently endemic, such as three species of peloridiid Hemiptera, but Smithers, in Recher and Ponder (1981), indicated that there is no consolidated list of the insects recorded from LHI and stated that preparation of such a list would be a "progressive step". The only record of Thysanoptera from the Island is the description of *Bolothrips australiensis* Moulton, referred to below under Idolothripinae, although there have been unconfirmed verbal reports of thrips damage to *Howea* palms in the nursery that is the main source of these domestic palms. The objective of this report is to detail the 33 species in 25 genera of Thysanoptera, representing three families, that were taken during a 6-day holiday on LHI in late November 1996. All of the material is slide-mounted and available at the Australian National Insect Collection, Canberra. Full nomenclatural data on the taxa listed here are available in Mound (1996) and Mound and Walker (1986).

Aeolothripidae

The 36 species and 12 genera of this family known from Australia have been revised recently by Mound and Marullo (1998).

Desmothrips reedi Mound. Described originally from New South Wales, this species is widespread in southern Australia between Sydney and Perth. A large population, including both sexes and larvae, was found on LHI, living at the base of the dense stand of kikuyu grass (*Pennisetum clandestinum*) that extends along the foreshore facing Lagoon Beach beneath Mt Gower. This thrips was associated with large numbers of a mite of the genus *Eupodes* (family Eupodidae, order Prostigmata: det. Anne Baker) on which it presumably was feeding. The thrips is a strongly bicoloured ant-mimic, with the first abdominal tergite bearing numerous transverse sculptured striae and with most individuals wingless.

Thripidae

The two subfamilies recognised in this family are both represented on LHI. Most of the thripid taxa listed here are also recorded from Australia and may be identified with the keys in Mound and Gillespie (1997).

Panchaethripinae

Helionothrips spinosus Wilson. Described from New South Wales, where it can be quite common near the coast, this large dark species was found near Settlement Beach and at Soldier's Creek. It breeds on leaves of the scrambling vine *Smilax australis* (Smilacaceae). The males have a tapering abdomen with a pair of very stout spines dorsally near the apex that are probably used in some form of competitive behaviour.

Heliethrips haemorrhoidalis (Bouché). This, the greenhouse thrips, is known worldwide as a pest on many different plants. On LHI it was found causing damage to leaves of *Howea* palms that were in poor health. It is a highly distinctive species, with a brown body and yellow legs when mature and with the body surface strongly reticulate.

Hercinothrips bicinctus (Bagnall). Widespread around the world as a minor pest of bananas and frequently common in eastern Australia, this species was taken at Soldier's Creek on leaves of the native plants *Marsdenia rostrata* (Asclepiadaceae) and *Alyxia ruscifolia* (Apocynaceae). The body surface is strongly reticulate but the forewings are bicoloured, brown and white.

Thripinae

Anaphothrips obscurus (Müller). This worldwide pest of wheat and other cereal crops was found in low numbers on kikuyu grass along the foreshore. The male remains unknown but females are either macropterous or micropterous, with the body yellow, and are unusual in having an oblique suture across the sixth antennal segment, giving the antenna the appearance of being 9-segmented.

Anaphothrips sudanensis Trybom. Another worldwide pest of cereal and sugar cane crops, both sexes of this species are strongly bicoloured. It was found on LHI along the foreshore on kikuyu grass.

Aptinothrips rufus Haliday. Found on grasses in temperate areas throughout the world, this wingless species with the terminal (sixth) antennal segment greatly enlarged was found on pasture grasses near Settlement Beach.

Bolacothrips pulcher (Girault). This genus of about 10 grass-living species of thrips is found throughout the Old World tropics and sub-tropics. On LHI, males and females of the Australian species, *B. pulcher*, were found on kikuyu grass at Settlement Beach and at Old Gulch. Both sexes are yellow with the apex of the abdomen dark brown and the forewings banded. Samples from Darwin, from north-east Queensland and from Canberra show slight differences in the colour of the antennae and the front of the head. Despite this, they are all considered here to represent a single species.

Dendrothrips sp. Although this genus is widespread across the Old World, in the Australasian region there is a single described species, from New Caledonia, with a second but undescribed species widespread in eastern Australia. A third species was found on LHI, apparently associated with leaves of *Smilax australis*.

Ensiferothrips sp. Only one species is described in this genus, from New Caledonia and eastern Australia. A second species was found on LHI in association with leaves of *Smilax australis*.

Hydatothrips sp. One specimen representing this genus was taken on LHI. The genus is represented in Australia by several species, all of which are currently poorly defined, being known only from fragmentary material.

Pseudanaphothrips achaetus Bagnall. Known throughout Australia and also from New Zealand, this polyphagous flower-living thrips was found on LHI only in the flowers of a small population of *Sesuvium portulacastrum* (Aizoaceae) at Ned's Beach.

Pseudodendrothrips sp. Only one named species of this genus is recorded from Australia, although at least two further species have been collected and are in the ANIC at Canberra. A further species, with strongly banded forewings, was taken on LHI, from leaves of *Alyxia ruscifolia* and *Smilax australis*. Relationships between the tiny thrips in this genus and also *Ensiferothrips* and *Dendrothrips*, all of which are presumed to be associated with the leaves of forest trees and are thus rarely collected, are the subject of continuing study.

Scirtothrips albomaculatus Bianchi. Like other *Scirtothrips*, this species breeds on young terminal leaves but the available records suggest that *S. albomaculatus* is opportunistic in its host plant and habitat associations. Based originally on a single female from New Caledonia, it has been taken at various localities in eastern Australia, including Mundubbera (Qld) on citrus, Brisbane (Qld) and Wiseman's Ferry (NSW) on mangrove leaves, and at the edge of the Simpson Desert (SA) on *Acacia cambagei* phyllodes. The

species is well established on LHI, where it was found in large numbers at several sites on leaves of *Dodonaea viscosa* (Sapindaceae).

Thrips imaginis Bagnall. The plague thrips of Australia was found only in low numbers on LHI but it was collected from the flowers of several plants, including *Lagunaria pattersoni* (Malvaceae), *Olea europea* (Oleaceae) and *Melaleuca* sp. (Myrtaceae).

Thrips tabaci Lindemann. Only a few specimens of this worldwide pest species were taken, all from flowers of cultivated *Agapanthus* (Liliaceae).

Phlaeothripidae

Two subfamilies are recognised in this family and representatives of both of these were found on LHI.

Idolothripinae

All species in this subfamily feed by ingesting whole fungal spores and they live in leaf litter, at the bases of grass tussocks, or on dead branches and dead leaves. *Bolothrips australiensis* Moulton was actually described from LHI, based on a single micropterous female. However, in providing keys to the 77 species in 24 genera of Idolothripinae known from Australia, Mound (1974) placed *B. australiensis* as a synonym of the common tropical tramp thrips, *Nesothrips lativentris* (Karny), a species that can be found on dead branches in coastal Queensland.

Carienthrips semirufus (Girault). Described originally from Melton, now a western suburb of Melbourne, and subsequently recorded from several sites in south-eastern New South Wales, this apterous species lives at the base of tussocks of grasses. It is strongly bicoloured, with the abdomen dark and the head and thorax yellow, but has the head considerably longer than wide, in contrast to *N. propinquus* (see below) which is found in similar habitats. Five specimens were taken on LHI, at the base of grasses along the path of Smoking Tree Ridge. These differ from the typical form of the species from south-eastern Australia in having the major setae on the ninth tergite finely acute and as long as the abdominal tube, instead of shorter than the tube and with capitate apices. Specimens identical with the LHI form have also been taken from grasses at Cape Tribulation, north of Cairns (Qld). This material represents either a further undescribed species or, judging from other material from further south in Queensland, a northern form in a cline along the eastern coast of Australia.

Nesothrips propinquus (Bagnall). This species is widespread along the old sailing ship route between New Zealand, Australia and Europe, presumably having been distributed in dry grass and hay. It lives at the base of tussocks of grass and is particularly varied in colour and structure in New Zealand, where it is considered to have originated (Mound and Walker 1986). Most of the specimens taken on LHI (all apterae) were of the "typical form", with the

abdomen black but the head, basal antennal segments, thorax, and legs yellow, although some individuals had the anterior part of the body brownish. Abdominal tergites II and III are foreshortened and the sternites of these segments lengthened; this is presumably related to the habit of the adults of holding the abdomen over the head when disturbed. This behaviour has the startling and confusing result of suddenly transmuting these elongate thrips into spherical 'mites'.

Phlaeothripinae

Members of this large subfamily have a wide range of biologies including leaf- and flower-feeding, but about half of the species feed only on fungal hyphae. No single set of identification keys is available to the 200 species and 75 genera currently recorded from Australia, although Mound (1996) lists references to several groups within this subfamily.

Baenothrips moundsi (Stannard). This wingless, fungus-feeding species with the tenth abdominal segment exceptionally elongate is widespread in Australia and New Zealand and lives at the base of grass tussocks. Females were taken on LHI at various sites, usually in association with kikuyu grass.

Baenothrips sp. Two wingless females taken from dead twigs at Soldier's Creek apparently represent an undescribed species. They have the dorsal pair of anal setae on the tube about one fifth as long as the other two pairs of anal setae, whereas these dorsal setae are about half as long as the other pairs in *B. moundsi*, and effectively absent in the only other known Australian member of this genus, *B. caenosus* (Stannard). The metepimeral setae are minute as in *B. caenosus* but the anterolateral setae on the head are elongate.

Deplorothisrips spp. This genus was erected for a single New Zealand species, *D. bassus*, which exhibits remarkable variation in structure between populations (Mound and Walker 1986). Subsequently, Okajima (1989) described six further species from several south-east Asian countries. On LHI, a series of wingless individuals, representing both sexes of one species, was taken from dead twigs and branches at Soldier's Creek. This species is closely similar to *D. bassus* but the pronotal posteroangular pair of setae have capitate, not pointed, apices. A solitary wingless male of a second species of this genus was taken along with the first species, but this has the hind tibiae and also the third antennal segment brown, not yellow.

Haplothrips angustus Hood. Widespread in Australia on grasses and sedges, females and males were taken together with larvae on a species of *Scirpus* growing along the margins of the lower reaches of Soldier's Creek.

Haplothrips sp. An unusual micropterous member of this genus, with the wings smaller than the width of the mesothoracic spiracular area and the ocelli not developed, was found commonly on leaves of various shrubs. The males have the fore legs and pronotum more strongly developed than the females, with a large fore tarsal tooth, suggesting that there is some form of

competition involved in the breeding behaviour. *Haplothrips* includes about 250 species worldwide, all of which are fully winged. This species is presumably undescribed and is a likely candidate as an endemic LHI species but requires considerable further study.

Hoplandrothrips sp. More than 80 species are currently listed in this genus worldwide, most of which feed on fungal hyphae on dead wood and often exhibit considerable sexual dimorphism. A macropterous male and female taken from the branches of a dead fallen tree at Lagoon Beach on LHI cannot at present be identified to species, although certainly they do not represent any species currently known from Australia. The female has enlarged, asymmetric, almost feather-like setae laterally on the tergites, although these are not so strongly developed in the male.

Hoplothrips orientalis (Ananthakrishnan). Described originally from southern India, this species has been recorded from several sites in New Zealand (Mound and Walker 1986). One series that included larvae together with micropterous adults of both sexes and one macropterous male was taken from old dead branches at Soldier's Creek on LHI. These specimens have dark antennal segments similar to those of the New Zealand samples, but in contrast to the specimens reported from that country the only major male found did not have a tubercle ventrally on the head.

Karnyothrips melaleucus (Bagnall). Apparently a predator of scale insects, this species has been found in many places throughout the tropics including the coast of Queensland. A single female was taken from kikuyu grass near Settlement Beach.

Karnyothrips sp. Three macropterous females of a haplothripine species with bright yellow hind tibiae were taken each at a different site on LHI. This species has a very small fore tarsal tooth but it remains unidentified, although it is probably referable to the genus *Karnyothrips*.

Macrophthalthrips argus (Karny). Described originally from Queensland, and subsequently described under three different names from Queensland, Hawaii and Tanzania, one female and three males together with larvae were taken on LHI from the dead branches of a fallen tree just behind Lagoon Beach. The species is a member of the fungal hyphae feeding cohort of thrips taxa that can be found commonly on dead twigs and branches particularly in tropical countries (Mound and Marullo 1996). As in so many other thrips species in this habitat, the males have enlarged fore legs with stout tubercles, indicating that the breeding behaviour involves some form of male/male competition or fighting.

Psalidothrips spp. One species of this genus was found in good numbers on LHI, at the base of native grasses at several sites along the valley from Soldier's Creek to Smoking Tree Ridge. This is a member of a complex of species found throughout Australia living in leaf litter, most of which remain

unstudied and undescribed. Specimens apparently identical to the LHI specimens have been studied both from eastern Australia and from New Zealand. The species is closely similar in colour and structure to *P. moeone* Mound & Walker from New Zealand, but has two equally large sense cones on the third antennal segment instead of only one. A single male of a second species of this genus was collected at the same site on LHI as the first species. However, this is one of the members of the genus that has three sense cones on the third antennal segment.

Stephanothrips barretti Mound. Described from a single female from near Brisbane (Qld), one female of this species was taken on LHI in Erskine Valley. Members of this genus are fungus feeders and are usually found in leaf litter, at the base of grasses, or on dead twigs.

Strepterothrips tuberculatus (Girault). Widespread in eastern Australia, this species is also known from New Zealand (Mound and Walker 1986). It is a fungus-feeding species that lives on dead, often rather dry, twigs. Two apterous females were taken on LHI at Soldier's Creek.

Faunal relationships

A total of 34 Thysanoptera species, in 26 genera, is now recorded from Lord Howe Island. Of these, almost 30% are tramp species, having been found in many countries around the world. Species found during this visit that are worldwide pests were *Aptinothrips rufus*, *Anaphothrips obscurus*, *Anaphothrips sudanensis*, *Hercinothrips bicinctus*, *Heliothrips haemorrhoidalis* and *Thrips tabaci*. Curiously no *Frankliniella* species were taken. Similarly widespread around the world are the fungus-feeding species *Nesothrips lativentris*, *Macrophthalthothrips argus* and *Hoplothrips orientalis*, and the predatory species *Karnyothrips melaleucus*. This intrusion of exotic species has implications for the Island as a nature conservation area. In terms of trading patterns, the Island is effectively an eastern suburb of Sydney and the resultant absence of quarantine restrictions sits uncomfortably with its World Heritage status, because it ensures the ready importation of foreign species. In this connection, it was noted that the scale insect, *Ceroplastes destructor*, which has recently become established on LHI, is evidently spreading through the native forests, resulting in blackened leaves where sooty moulds are growing on the honeydew excreted by these insects.

In contrast to many insect species, introduced thrips in mainland Australia commonly do not invade areas of native vegetation and this pattern was evident on LHI. Most of the tramp species listed above were not found within the native forest but were associated with kikuyu grass or garden plants. The contrast between the thrips found on native grasses along the forest paths and the thrips found on kikuyu grass a few metres away outside the forest, was striking.

A second major element in the thrips fauna of LHI is the 30% of species that are shared with mainland Australia. These include flower thrips *Pseudanaphothrips achaetus* and *Thrips imaginis*, the leaf-feeders *Helionothrips spinosus* and *Scirtothrips albomaculatus*, grass thrips *Bolacothrips pulcher* and *Haplothrips angustus*, and fungus feeders *Carienthrips semirufus*, *Baenthrips moundi*, *Stephanothrips barretti* and *Strepterothrips tuberculatus*. A third element in the fauna suggests relationships with New Zealand, particularly the undescribed species of *Deplorothrips* and *Psalidothrips*. However, these could be introductions due to human trading, as with other species that are shared between Australia, LHI and New Zealand.

Finally, some of the unidentified species listed above are probably endemics, particularly the leaf-feeding species of *Dendrothrips*, *Pseudodendrothrips* and *Ensiferothrips*, because members of these genera usually have localised distributions. Also, the micropterous *Haplothrips* species discussed above is possibly an endemic. However, it would be unwise to describe new species on this material without a more extensive study of their relationships, particularly considering the inadequate sampling of the thrips fauna of the east coast of Australia (see Mound 1996).

References

- GREEN, P.S. 1994. Norfolk Island and Lord Howe Island; pp 1-26 in *Flora of Australia* 49, Oceanic Islands 1.
- HUTTON, I. 1986. *Discovering Australia's World Heritage. Lord Howe Island*. Conservation Press, ACT, 157 pp.
- MOUND, L.A. 1996. Thysanoptera; pp 249-336, 397-414 (index) in Wells, A., *Zoological Catalogue of Australia*. Volume 26. Psocoptera, Phthiraptera, Thysanoptera. CSIRO, Melbourne.
- MOUND, L.A. and GILLESPIE, P.S. 1997. *Identification Guide to Thrips Associated with Crops in Australia*. NSW Agriculture, Orange, 56 pp.
- MOUND, L.A. and MARULLO, R. 1998. The biology and identification of the Aeolothripidae (Thysanoptera) in Australia. *Invertebrate Taxonomy*, in press.
- MOUND, L.A. and WALKER, A.K. 1986. Tubulifera (Insecta: Thysanoptera). *Fauna of New Zealand* 10: 1-140.
- OKAJIMA, S. 1989. The genus *Deplorothrips* Mound et Walker (Thysanoptera, Phlaeothripidae) from Eastern Asia, with descriptions of six new species. *Japanese Journal of Entomology* 57: 241-256.
- RECHER, H.F. and PONDER, W.F. (eds) 1981. *Lord Howe Island. A summary of current and projected scientific and environmental activities*. The Australian Museum, Sydney, 72 pp; unpublished report.

THE LIFE HISTORY OF *HYPOCHRYSOPS POLYCLETUS ROVENA* DRUCE (LEPIDOPTERA: LYCAENIDAE)

S.J. JOHNSON¹ and P.R. SAMSON²

¹Oonoonba Veterinary Laboratory, PO Box 1085, Townsville, Qld 4810

²Bureau of Sugar Experiment Stations, PMB 57, Mackay Mail Centre, Qld 4741

Abstract

The life history of *Hypochrysops polycletus rovena* Druce in northern Queensland, Australia is recorded and illustrated. The larval food plant is *Rhyssopterys timorensis* (Blume) Juss. (Malpighiaceae).

Introduction

Hypochrysops polycletus rovena Druce is known in Australia from northern Cape York Peninsula to Sarina (Common and Waterhouse 1981; Sands 1986). Elsewhere *H. polycletus* (Linnaeus) occurs from the Moluccas eastwards through mainland Irian Jaya and Papua New Guinea to New Ireland and a record from Torres Strait, Queensland (Sands 1986). Apart from an observation of females ovipositing on *Rhyssopterys timorensis* in Papua New Guinea (Sands 1986), nothing has been known of the life history of the species.

During a search of *R. timorensis* vines on central Cape York Peninsula for the immature stages of *Allora doleschallii* (Felder) (Hesperiidae) in 1990, we found the immature stages of *H. p. rovena* on many of the same plants. Subsequently we have found the immature stages from several locations in northern Queensland.

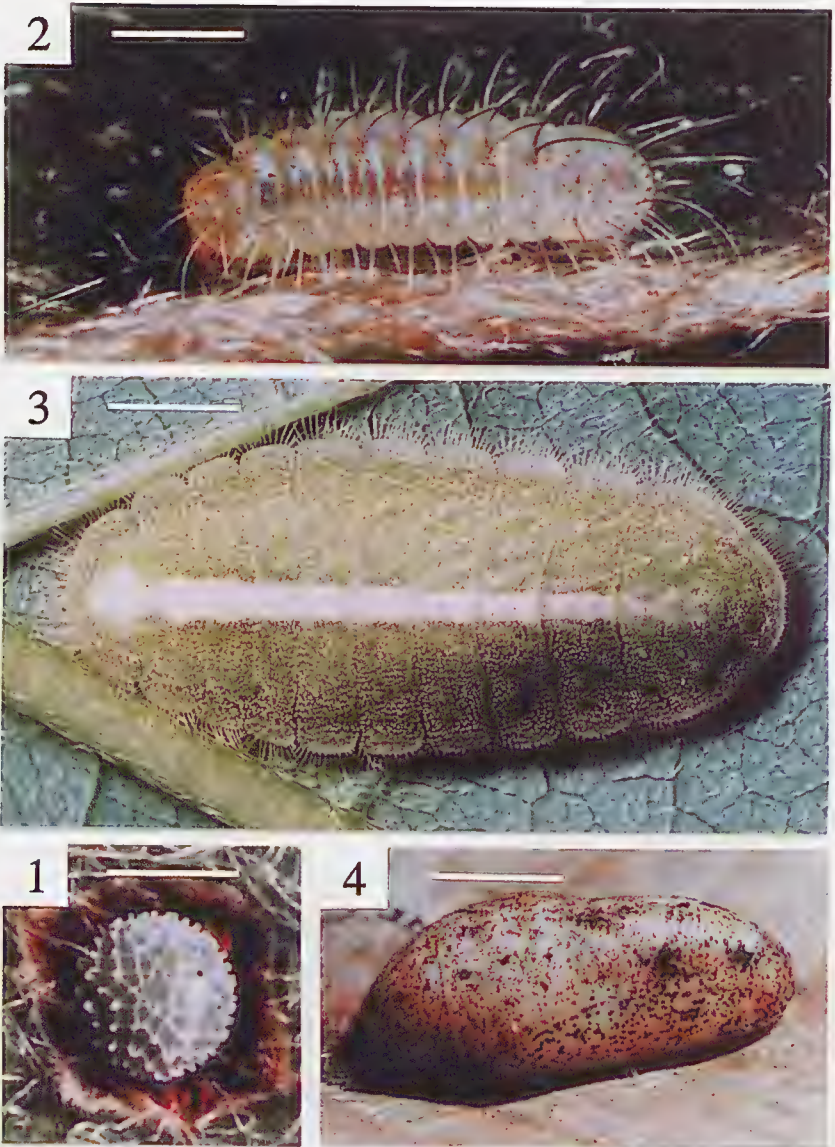
Life History

Food plant. *Rhyssopterys timorensis* (Blume) Juss. (Malpighiaceae).

Egg (Fig. 1). Blue-green; dome-shaped with very fine ridges forming irregular, mostly 4-sided pits, raised at their intersection to knobs with blunt roughened tips; diameter 0.6 mm.

First instar larva (Fig. 2). Pale green, white dorsally; flattened, 1 pair of short pale and 1 pair of long black dorsal hairs on most segments; long marginal hairs, mostly white but some black at posterior end; head pale greenish brown; prothoracic plate pale green; anal plate grey.

Second to final instar larvae (Fig. 3). Green, becoming pale pinkish prior to pupation, white middorsal line and obscure white oblique dorsolateral lines; flattened at sides with white marginal hairs and dense pale and dark secondary setae; head pale brown; prothoracic plate diamond shaped, green with white markings; anal plate green with white markings. Newcomer's and tentacular organs present.



Figs 1-4. *Hypochrysops polycletus rovena*: (1) egg; (2) first instar larva, head at left; (3) final instar larva, head at left; (4) pupa. Scale bars (1, 2) = 0.5 mm, (3, 4) = 3 mm.

Pupa (Fig. 4). Pale brown speckled with dark brown, a median dark brown patch at front of head, dark brown patches laterally and dorsolaterally on thorax and abdomen; attached by anal hooks and central girdle. Length 11-13 mm.

Discussion

Eggs, which are unusually small for the size of the adult, are laid singly beneath leaves, often in scar tissue or on stems or flower buds. Early instar larvae shelter beneath juvenile leaves and eat small patches from the epidermis. Larger larvae often shelter on stems or leaf petioles and commonly feed on growing tips, stems of fresh shoots and on petioles of leaves, which causes younger leaves to wilt and die. Smaller vines are often denuded of fresh foliage by larger larvae and remaining small larvae are often unable to achieve full size and emerge as small adults. A larva which had access to only mature leaves in captivity appeared to imbibe fluid from the leaf nectaries. Pupation occurs in curled dead leaves caught within the vine stems or at the base of the plant. In summer, the life cycle may be completed in 5-6 weeks.

We found immature stages in most months of the year on plants that continued to produce new growth. In vine thicket areas where *R. timorensis* is a common element of the flora, most vines are deciduous during the dry season and unable to support larvae of *H. polycletus*, but occasional larger vines produce fresh foliage throughout the year and maintain a reduced population of *H. polycletus*. During the wet season the vines produce copious foliage and the population of *H. polycletus* expands to exploit the available food resource. From April to June adults may be locally common in vine thicket areas in central Cape York Peninsula.

In most areas the larvae are not attended by ants but at McCleod Creek, north of Cooktown, larvae are attended by *Camponotus* sp. and on Cape York Peninsula larvae are occasionally attended by small unidentified black ants. Ant attendance appears to be facultative and restricted to the same few vines in each area. We have not found the immature stages of *H. polycletus* on plants infested with green tree ants *Oecophylla smaragdina* (Formicidae).

References

- COMMON, I.F.B. and WATERHOUSE, D.F. 1981. *Butterflies of Australia*. Angus and Robertson, Sydney; xiv + 682 pp.
- SANDS, D.P.A. 1986. A revision of the Genus *Hypochrysops* C. & R. Felder (Lepidoptera: Lycaenidae). *Entomograph* 7: 1-116.

AN ACCUMULATIVE BIBLIOGRAPHY OF
AUSTRALIAN ENTOMOLOGY

Compiled by G. Daniels

DANIELS, G.

1998 Orthorrhaphous Diptera from Lawn Hill National Park and Musselbrook Reserve, Queensland. Pp. 87-88 in Comben, L., Long, S. and Berg, K. (eds.), *Musselbrook Reserve Scientific Study Report*. Royal Geographical Society of Queensland: Brisbane.

DANIELS, G. and EDWARDS, E.D.

1998 Butterflies from Lawn Hill National Park and Musselbrook Reserve, Queensland. Pp. 89-91 in Comben, L., Long, S. and Berg, K. (eds.), *Musselbrook Reserve Scientific Study Report*. Royal Geographical Society of Queensland: Brisbane.

DISNEY, R.H.L.

1992 A new species and new records of Phoridae (Diptera) from New Zealand. *G. ital. Ent.* 6: 119-124

DISNEY, R.H.L. and BARTAREAU, T.

1995 A new species of *Dohrniphora* (Diptera: Phoridae) associated with a stingless bee (Hymenoptera: Apidae) in Australia. *Sociobiology* 26: 229-240.

DOLLIN, A.E., DOLLIN, L.J. and SAKAGAMI, S.F.

1997 Australian stingless bees of the genus *Trigona* (Hymenoptera: Apidae). *Invert. Taxon.* 11: 861-896.

DOWTON, M., AUSTIN, A.D., and ANTOLIN, M.F.

1998 Evolutionary relationships among the Braconidae (Hymenoptera: Ichneumonidae) inferred from partial 16S rDNA gene sequences. *Insect molec. Biol.* 7: 129-150.

DYCE, A.L. and WIRTH, W.W.

1997 The *purus* group, a newly recognised natural species-group in the genus *Culicoides* (Diptera: Ceratopogonidae), including species from Australia, New Guinea and Sulawesi. *Invert. Taxon.* 11: 575-598.

EDWARDS, E.D.

1998 Moths (Lepidoptera) of the Musselbrook area. Pp. 125-134 in Comben, L., Long, S. and Berg, K. (eds.), *Musselbrook Reserve Scientific Study Report*. Royal Geographical Society of Queensland: Brisbane.

EWART, A.

1998 Cicadas of Musselbrook Reserve. Pp. 135-138 in Comben, L., Long, S. and Berg, K. (eds.), *Musselbrook Reserve Scientific Study Report*. Royal Geographical Society of Queensland: Brisbane.

1998 Cicadas, and their songs, of the Miles-Chinchilla region. *Qd Nat.* 36: 54-72.

EXLEY, E.M.

1998 New *Euryglossa* (*Euhesma*) bees (Hymenoptera: Colletidae: Euryglossinae) associated with the Australian plant genus *Eremophila* (Myoporaceae). *Rec. West. Aust. Mus.* 18: 419-437.

FIELD, S.A. and KELLER, M.A.

1993 Alternative mating tactics and female mimicry as post-copulatory mate-guarding behaviour in the parasitic wasp *Cotesia rubecula*. *Anim. Behav.* 46: 1183-1189.

FISCHER, M.

1997 Redeskription von *Opius* (*Gastrosema*) *waterloti* Granger und *Opius* (*Gastrosema*) *hedqvisti* Fischer sowie Bestimmungsschlüssel für die Arten der Untergattung *Gastrosema* Fischer der athiopischen, orientalischen und australischen Region (Hymenoptera, Braconidae, Opiinae, *Opius* Wesm.). *Z. ArbGem. öst. Ent.* 49: 121-127.

FLOATER, G.J.

1998 Tuft scales and egg protection in *Ochrogaster lunifer* Herrich-Schäffer (Lepidoptera: Thaumetopocidae). *Aust. J. Ent.* 37: 34-39.

GREENSLADE, P.J.M. and DEHARVENG, L.

1997 Revision of *Friesea* species (Collembola: Neanuridae) of Australia and offshore islands, with biogeographical notes and key to species. *Invert. Taxon.* 11: 321-331.

GULLAN, P.J. and BROOKES, H.M.

1998 Giant females and bird-of-paradise flies: notes on the biology of *Callipappus* Guérin-Méneville (Hemiptera: Margarodidae). *Aust. J. Ent.* 37: 2-7.

GULLAN, P.J. and STRONG, K.L.

1997 Scale insects under eucalypt bark: a revision of the Australian genus *Phacelococcus* Miller (Hemiptera: Coccoidea: Eriococcidae). *Aust. J. Ent.* 36: 229-240.

HARDWICK, T.A., COOPER, P.D., CRANSTON, P.S., HUMPHREY, C.L. and DOSTINE, P.L.

1995 Spatial and temporal distribution patterns of drifting pupal exuviae of Chironomidae (Diptera) in streams of tropical northern Australia. *Freshwat. Biol.* 34: 569-578.

HOFFMANN, B.D.

1998 Thermophilia in a tropical Australian ant of the *Melophorus aeneovirens* (Lowne) species-group (Hymenoptera: Formicidae). *Aust. J. Ent.* 37: 162-167.

HORAK, M.

1997 The phycitine genera *Faveria* Walker, *Morosaphycita*, gen. n., *Epicrocis* Zeller, *Pryobathra* Turner and *Vinicia* Ragonot in Australia (Pyralidae: Phycitinae). *Invert. Taxon.* 11: 333-421.

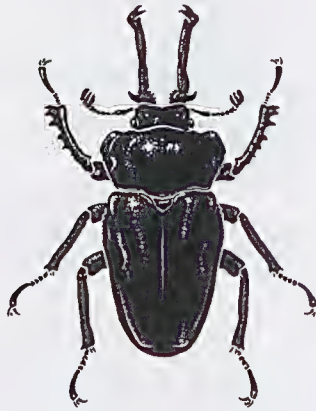
HUDDLESTON, T. and WALKER, A.K.

1994 A revision of the *Chelonus scrobiculatus* species-group of Cheloninae (Insecta: Hymenoptera: Braconidae). *Annl. naturh. Mus. Wien* (B) 96: 153-168.

JENNINGS, J.T. and AUSTIN, A.D.

1997 Revision of *Aulacofoenus* Kieffer (Hymenoptera: Gasteruptionidae), hypitiogastrine wasps with a restricted Gondwanic distribution. *Invert. Taxon.* 11: 943-976.

THE
AUSTRALIAN
ENTOMOLOGIST



VOLUME 25

1998

Published by:

THE ENTOMOLOGICAL SOCIETY OF QUEENSLAND

THE AUSTRALIAN ENTOMOLOGIST

The Australian Entomologist is a non-profit journal published in four parts annually by the Entomological Society of Queensland. The journal is devoted to entomology of the Australian region, including New Zealand, Papua New Guinea and islands of the south-western Pacific. Articles are accepted from amateur and professional entomologists. The journal is produced independently and subscription to the journal is not included with membership of the Society.

The Editorial Panel

Editor:	Dr D.L. Hancock Dept Of Primary Industries
Assistant Editors:	Dr C.J. Burwell Queensland Museum Mr G. Daniels University of Queensland Dr G.B. Monteith Queensland Museum
Business Manager:	Mr A. Loch University of Queensland

Subscriptions

Subscriptions are payable in advance to the Business Manager, The Australian Entomologist, P.O. Box 537, Indooroopilly, Qld, Australia, 4068.

For individuals	A\$16.00 per annum Australia A\$20.00 per annum elsewhere
For institutions	A\$20.00 per annum Australia. A\$22.00 per annum elsewhere.

Cheques in currency other than Australian dollars should include an extra A\$5.00.

ISSN 1320-6133

Printed for The Entomological Society of Queensland
by Hans Quality Print, Brisbane
Copyright Reserved, 1998

THE AUSTRALIAN ENTOMOLOGIST
Contents
Volume 25, 1998

BROUGHTON, S. The distribution of lantana beetles (Coleoptera: Chrysomelidae: Hispinae) in Queensland.	39
CLARKE, A. R. Day-degree estimates for the immature stages of the Tasmanian eucalyptus leaf beetle <i>Chrysophtharta bimaculata</i> (Olivier) (Coleoptera: Chrysomelidae).	77
EASTWOOD, R. and KING, A.J. Observations on the biology of <i>Arhopala wildei</i> Miskin (Lepidoptera: Lycaenidae) and its host ant <i>Polyrhachis queenslandica</i> Emery (Hymenoptera: Formicidae).	1
HANCOCK, D.L. Notes on some fruit flies (Diptera: Tephritidae) described by Francis Walker.	67
HAY, A.M. A note on catches of fruit flies (Diptera: Tephritidae) at different trap heights in north Queensland.	87
HAYASHI, M. and MOULDS, M.S. Observations on the eclosion of the hairy cicada <i>Tettigarcta crinita</i> Distant (Homoptera: Cicadoidea: Tettigarctidae).	97
HUMPHREYS, W.F. <i>Phaconeura</i> (Homoptera: Meenoplidae) attended by ants of the genus <i>Paratrechina</i> (Hymenoptera: Formicidae) in caves.	23
JOHNSON, A.J. and SAMSON, P.R. The life history of <i>Hypochrysops polycletus rovena</i> Druce (Lepidoptera: Lycaenidae).	121
KRAKE, G.J. Description of the female of <i>Eucarteria subvittata</i> Moore (Coleoptera: Lucanidae).	93
MOORE, B.P. A new genus and species of flightless Carabidae (Coleoptera) from Fiji.	103
MOULDS, M.S. New larval foodplants for Australian hawk moths (Lepidoptera: Sphingidae).	13
MOULDS, M.S. and HANGAY, G. First record of the bladder cicada <i>Cystosoma saundersii</i> (Westwood) from Lord Howe Island (Hemiptera: Cicadidae).	75
MOULDS, M.S. and LACHLAN, R.B. An annotated list of the hawk moths (Lepidoptera: Sphingidae) of Western Province, Papua New Guinea.	45
MOUND, L.A. A peripatetic Australian thrips (Thysanoptera: Phlaeothripidae) in <i>Eucalyptus</i> seed capsules.	85

MOUND, L.A.	
Thysanoptera from Lord Howe Island.	113
MULLER, C.J.	
New larval foodplant records for butterflies (Lepidoptera) in northern Queensland.	33
MULLER, C.J. and HALL, D.	
New distribution and hostplant records for butterflies (Lepidoptera) in New South Wales.	65
MULLER, C.J., OLIVE, J. and LAMBKIN, T.	
New records for <i>Petrelaea tombugensis</i> (Rober) (Lepidoptera: Lycaenidae) in Queensland.	61
SMITHERS, C.N.	
Description of the male of <i>Trogium evansorum</i> Smithers (Psocoptera: Trogiidae) from Norfolk Island, with a key to the species of the genus.	89
WALTER, D.E.	
<i>Hoploseius australianus</i> sp. nov. (Acari: Mesostigmata: Ascidae), a unique element in the Australian acarofauna.	69
WATTS, C.H.S., McARTHUR, A.J. and FOSTER, R.	
Notes on the distribution of the dinosaur ant <i>Nothomyrmecia macrops</i> Clark (Hymenoptera: Formicidae) in South Australia.	29
WELLS, A.	
Two new species of Hydroptilidae (Trichoptera) from Tasmania's World heritage area.	81
WILLIAMS, A.A.E. and POWELL, R.J.	
The butterflies (Lepidoptera) of east and west Wallabi Islands, Western Australia.	107
WILLIAMS, A.A.E., WILLIAMS, M.R. and HAY, R.W.	
A new species of <i>Trapezites</i> Hübner (Lepidoptera: Hesperiiidae) from Western Australia.	7
RECENT LITERATURE	32, 64, 92, 96, 102, 124

Publication dates:	Part 1 (pp 1-32)	5 June 1998
	Part 2 (pp 33-64)	17 July 1998
	Part 3 (pp 65-96)	21 December 1998
	Part 4 (pp 97-124)	12 February 1999

ENTOMOLOGICAL NOTICES

Items for insertion should be sent to the editor who reserves the right to alter, reject or charge for notices.

FOR SALE: Butterflies from all parts of the world. Papua New Guinea, Peru, Indonesia, Thailand, China, Africa, Brazil, Colombia, etc. Papilionidae inc. Parnassius, Delias, Charaxes etc. Free catalogue. David Hall, 6 Rule St, Cambridge Park, N.S.W., 2747. Ph. (047) 312 410.

INSECT CABINETS FOR SALE. 8-drawer wooden cabinets with recessed outer door and naphthalene well. 560 x 400 x 36 mm. \$200; 1 only 1-drawer wooden cabinet without naphthalene cell 475 x 330 x 45 mm. \$350. G. Daniels 07 3365 7084. E-mail: g.daniels@ento.uq.edu.au

ENTOMOLOGICAL BOOKS. Pemberley Books are specialist suppliers of entomological literature across the world. Send for our free catalogue which lists a wide range of antiquarian, second-hand and new natural history titles. Pemberley Books, Ian Johnson, 34 Melrose Close, Hayes, Middlesex, UB4 0AZ, England. Tel/Fax: +44 181 561 5494. E-mail: ij@pembooks.demon.co.uk

FOR SALE. In Canberra, two-door cedar insect cabinet, 24 drawers. Once housed J.E. Dixon collection in Melbourne. Cabinet 102 cm high, 79.5 cm wide, 44.5 cm deep. Drawers 35.9 cm wide x 39.8 cm deep, most relined with thick composition cork and repapered. Neat-fitting wood-framed glass-topped lids. Clearance above cork to base ca. 55 mm. Offers appreciated. 02 6281 3319. E-mail: oldhamwh@dynamite.com.au

NOTES FOR AUTHORS

Manuscripts submitted for publication should, preferably, be type-written, double spaced and in triplicate. Refer to recent issues for layout and style.

All papers will be forwarded to two referees and the editor reserves the right to reject any paper considered unsuitable.

Papers longer than eight printed journal pages will normally not be accepted.

Papers will be accepted only if a minimum of 100 reprints is purchased. Manuscripts occupying less than one printed page may be accepted without charge if no reprints are required. Charges are as follows: cost per printed page \$25 for 100 copies. Page charges may be reduced at the discretion of the Publications Committee.

Illustrations: Black and white photographs must be submitted at the size they are to appear in the journal. Line drawings should be about twice their required size.

Address papers to:

The Editor
The Australian Entomologist
P.O. Box 537,
Indooroopilly, Queensland, 4068